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3         upon loading of the class that has the empty initialization function by the
4         task, creating the task class mirror object that holds the task private representation
5         of the class;

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6 setting the task class mirror object's state to fully initialized; and

7 assigning the task class mirror object's pointer to the initialized entry of
8 the task class mirror table associated with the class for that task.

1 33. An apparatus to efficiently realize class initialization barriers in a
2 multitasking virtual machine, wherein class loading always takes place before
3 class initialization, and wherein a class initialization barrier guarantees that a class
4 is initialized before the class is first used by a program, comprising:

an associating mechanism that is configured to associated a shared runtime representation of the class with a task class mirror table that comprises at least one entry per-task, including an initialized entry, for a plurality of tasks, wherein each entry holds either a null pointer value or a non-null pointer to a task class mirror object, wherein all entries of a task mirror table that hold a non-null pointer value and that are associated with a same task hold a pointer to a same task class mirror object, wherein the task class mirror object holds a task private representation of the class for that task;

13 a determining mechanism that is configured to use the initialized entry of a
14 task in the task class mirror table to determine whether this task has initialized the
15 class associated with the task class mirror table; and

16 an accessing mechanism that is configured to access the task class mirror
17 object associated to a particular task.

1 34. The apparatus of claim 33,

1 35. The apparatus of claim 34, further comprising:
2 a creating mechanism that is configured to create the task class mirror
3 table and associating the task class mirror table with the shared runtime
4 representation of the class upon creation of the shared runtime representation of
5 the class; and
6 a setting mechanism that is configured to set all entries of the task class
7 mirror table to the null pointer value.

1 36. The apparatus of claim 35, further comprising:
2 an examining mechanism that is configured to examine the initialized
3 entry of the task in the task class mirror table associated with the class in order to
4 determine if that task has initialized the class, wherein the byte-offset to the
5 initialized entry from the beginning of the task class mirror table is obtained from
6 the descriptor of a thread performing an examination on behalf of the task; and
7 an initializing mechanism that is configured to initialize the class by the
8 task if the class is not already initialized, wherein a null pointer stored at the
9 initialized entry indicates that the class has not initialized the task.

1 37. The apparatus of claim 36,

2 wherein the setting mechanism is further configured to set the initialized
3 entry of the task class mirror table associated with the class to the task class mirror
4 object that holds a representation of the class that is private to the task; and
5 wherein the setting mechanism is further configured to set this task class
6 mirror object to a fully initialized state.

1 38. The apparatus of claim 37, wherein task class mirror tables
2 associated with classes that have a non-empty initialization function includes one
3 resolved entry per-task in addition to one initialized entry per-task, for the
4 plurality of tasks.

1 39. The apparatus of claim 38, wherein task class mirror tables
2 associated with classes that have an empty initialization function includes one
3 resolved entry per-task in addition to an initialized entry per-task, for the plurality
4 of tasks.

1 40. The apparatus of claim 39,
2 wherein the creating mechanism is further configured to create the task
3 class mirror object that holds the task private representation of the class;
4 wherein the setting mechanism is further configured to set the task class
5 mirror object's state to loaded; and
6 further comprising an assigning mechanism that is configured to assign the
7 task class mirror object's pointer to a resolved entry of the task class mirror table
8 associated with the class for that task.

1 41. The apparatus of claim 40,
2 wherein the task class mirror table is arranged so that the resolved entry